IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Applicant(s): Boer et al.
Case: 10-6-6-6
Serial No.: 10/562,619
Filing Date: May 26, 2006
Group: 2416
Examiner: Candal Elpenord

Title: Method and Apparatus for Backwards Compatible Communication in a Multiple Input Multiple Output Communication System with Lower Order Receivers

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APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicants hereby appeal the final rejection dated January 22, 2009, of claims 1-4, 6-17, 19-24, 26-28, 30, 34, and 38-41 of the above-identified patent application.

REAL PARTY IN INTEREST

The present application is assigned to Agere Systems Inc., as evidenced by an assignment recorded on May 24, 2006 in the United States Patent and Trademark Office at Reel 017680, Frame 0233. The assignee, Agere Systems Inc., is the real party in interest.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

STATUS OF CLAIMS

The present application was filed on May 26, 2006 with claims 1 through 41. Claims 5, 18, 25, and 29 were cancelled in the Amendment and Response to Office Action dated

April 28, 2008. Claims 31-33 and 35-37 were cancelled in the Amendment After Final Rejection dated April 22, 2009. Claims 1-4, 6-17, 19-24, 26-28, 30, 34, and 38-41 are presently pending in the above-identified patent application. Claims 1-4, 6, 8-17, 19, 21 and 38-41 are rejeeted under 35 U.S.C. §102(e) as being anticipated by Gardner et al. (United States Publication No. 2005/0233709), claims 7 and 20 are rejected under 35 U.S.C. §103(a) as being unpatentable over Gardner et al. in view of Kadous et al. (United States Publication No. 2004/0121730), claims 22-24 and 26-28 are rejected under 35 U.S.C. §103(a) as being unpatentable over Gardner et al. in view of Kadous et al., claims 30, 32-34, and 36 are rejected under 35 U.S.C. §103(a) as being unpatentable over Gardner et al. in view of Banister et al. (United States Patent No. 7,248,638 B1), and claims 31 and 35 are rejected under 35 U.S.C. §103(a) as being unpatentable over Gardner et al. in view of Banister et al. as applied to claims 30 and 34 above, and further in view of Crawford et al. (United States Publication No. 2003/0002471).

Claims 1, 14, 22, 26, 30, 34, and 38 are being appealed.

STATUS OF AMENDMENTS

The amendments filed subsequent to the final rejection have been entered.

SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 is directed to a method for transmitting one or more training symbols in a multiple antenna communication system (FIG. 1: 100; page 4, lines 18-26), said method comprising the step of:

transmitting from a transmitter (FIG. 1: TX) having N antennas (FIG. 1: 110) at least one training symbol using at least one antenna, such that said at least one training symbol can be interpreted by a receiver having M antennas, where M is less than N and wherein said at least one training symbol comprises a plurality of subcarriers and wherein each of said subcarriers are active on only one of said N antennas at a given time (page 10, line 13, to page 11, line 7).

Independent claim 14 is directed to a transmitter (FIG. 1: TX) in a multiple antenna communication system (FIG. 1: 100; page 4, lines 18-26), comprising:

N transmit antennas (FIG. 1: 110) for transmitting at least one training symbol using at least one antenna, such that said at least one training symbol can be interpreted by a

receiver having M antennas, where M is less than N and wherein said at least one training symbol comprises a plurality of subcarriers and wherein each of said subcarriers are active on only one of said N antennas at a given time (page 10, line 13, to page 11, line 7).

Independent claim 22 is directed to a method for receiving data on at least one receive antenna (FIG. 1: 115) transmitted by a transmitter (FIG. 1: TX) having a plurality of transmit antennas (FIG. 1: 110) in a multiple antenna communication system (FIG. 1: 100; page 4, lines 18-26), said method comprising the step of:

receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication can be interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of transmit antennas (page 10, lines 13-26, and page 11, lines 8-27); and

deferring for said indicated duration (page 11, lines 24-25).

Independent claim 26 is directed to a receiver (FIG. 1: RX) in a multiple antenna communication system having at least one transmitter (FIG. 1: TX) having a plurality of transmit antennas (FIG. 1: 100 and 110; page 4, lines 18-26), comprising:

at least one receive antenna (FIG. 1: 115) for receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication can be interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of antennas (page 10, lines 13-26, and page 11, lines 8-27); and

means for deferring for said indicated duration (page 11, lines 24-25).

Independent claim 30 is directed to a method for communicating in a multiple antenna communication system (FIG. 1: 100; page 4, lines 18-26), said method comprising the step of:

transmitting one or more symbols from a transmitter having N transmit branches (FIG. 1: TX and 110);

obtaining feedback at said transmitter (FIG. 1: TX) from at least one receiver indicating a performance for at least one of said N transmit branches (page 9, line 26, to page 10, line 1); and

adapting one or more parameters of said at least one of said N transmit branches based on said feedback, wherein said one or more parameters includes a modulation scheme and encoding rate (page 9, line 26, to page 10, line 1).

Independent claim 34 is directed to a transmitter (FIG. 1: TX) in a multiple antenna communication system (FIG. 1: 100; page 4, lines 18-26), comprising:

N transmit branches for transmitting one or more symbols (FIG. 1: TX and 110);

a feedback path for obtaining feedback at said transmitter from at least one receiver indicating a performance for at least one of said N transmit branches (page 9, line 26, to page 10, line 1); and

means for adapting one or more parameters of said at least one of said N transmit branches based on said feedback, wherein said one or more parameters includes a modulation scheme and encoding rate (page 9, line 26, to page 10, line 1).

Independent claim 38 is directed to a method for transmitting data in a multiple antenna communication system having N transmit antennas (FIG. 1: 100; page 4, lines 18-26), said method comprising the step of:

transmitting a legacy preamble having at least one long training symbol and at least one additional long training symbol on each of said N transmit antennas (FIG. 1: 110) of a transmitter (FIG. 1: TX), such that said training symbols can be interpreted by a receiver having M antennas, where M is less than N and wherein said at least one training symbol comprises a plurality of subcarriers and wherein each of said subcarriers are active on only one of said N antennas at a given time (page 10, line 13, to page 11, line 7).

STATEMENT OF GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-4, 6, 8-17, 19, 21 and 38-41 are rejected under 35 U.S.C. §102(e) as being anticipated by Gardner et al., claims 22-24 and 26-28 are rejected under 35 U.S.C. §103(a) as being unpatentable over Gardner et al. in view of Kadous et al., and claims 30, 32-34, and 36 are rejected under 35 U.S.C. §103(a) as being unpatentable over Gardner et al. in view of Banister et al.

ARGUMENT

Independent Claims 1, 14, and 38

Independent claims 1, 14, and 38 were rejected under 35 U.S.C. §102(e) as being anticipated by Gardner et al. Regarding claim 1, the Examiner asserts that Gardner discloses wherein each of said subcarriers (paragraphs 0052, lines 6-12) are active on only one of said N

antennas at a given time (the receiver operates on only one of the 20 MHz channel(s) to decode part of the packet; paragraph 0054, lines 4-9). In the Response to Arguments section of the final Office Action, the Examiner asserts that Gardner contemplates using one of the transmit antennas to transmit one long training symbol using one set of subcarriers (i.e., even subcarriers) and the other transmitter may transmit another long training symbol using an odd set of subcarriers at a particular time interval and that the Examiner is equating transmitting a long training symbol using an even set of subcarriers as equivalent to the claimed feature "wherein each of the subcarriers are active on only one of the N antennas at a given time."

In the text cited by the Examiner, Gardner teaches:

> [0052] If two adjacent channels are used simultaneously by one device, then there is no need to attenuate the "out-of-band subcarriers" in the middle of this 40 MHz band. An example of this is shown in FIG. 6. The out-of-band subcarriers that are in between the two 20 MHz channels thus need not be attenuated. In FIG. 4, the sequence L_4 is the long training symbol sequence for a 40 MHz preamble, which contains all 128 subcarrier values for a 40 MHz channel long training symbol. *The first 32 values are identical to the last 32 values of a 20 MHz preamble, corresponding to the subcarriers in the left part of a 20 MHz channel.* One difference between L_4 and two separate 20 MHz long training sequences is that the DC subcarriers are at different locations, so at the position where a 20 MHz channel would normally have its DC subcarrier, the 40 MHz sequence can have a nonzero subcarrier value. In L_4, these are subcarrier numbers 33 and 97, respectively.
> [0053] With unattenuated out-of-band subcarriers, signaling information can be carried on those subcarriers during packet setup, such as signaling operating and/or extension modes during a preamble, and additional data can be carried on those subcarriers, to increase the datarate.
> [0054] FIG. 7 shows the case of four 20 MHz channels.
> [0055] One example of a modified preamble is the preamble shown in FIG. 1 modified as shown in FIG. 8. The long training symbol values for these out-of-band subcarriers can be the same as in the case of FIG. 1. *The long training symbol is followed by a replica of the Signal field with identical subcarrier values in each of the 20 MHz channels. This ensures that a receiver that operates on just one of the <u>20 MHz channels</u> will still be able to successfully decode at least the first part of the packet containing the Signal field and defer for the rest of the packet, as decoding the Signal field provides the receiver with information about the length of the packet and thus how long to defer.* The same technique can be extended to an arbitrary number of channels.
> (Emphasis added.)

As disclosed above and in, for example, paragraph [0006], Gardner acknowledges that a channel is comprised of subcarriers, as would be apparent to a person of ordinary skill in

the art. Gardner teaches, however, to operate "*on just one of the 20 MHz channels*." Contrary to the Examiner's assertion, Gardner does *not* disclose or suggest that each of the subcarriers are *active on only one of the N antennas at a given time.*

Regarding the Examiner's assertion that Gardner contemplates using one of the transmit antennas to transmit one long training symbol using one set of subcarriers (i.e., even subcarriers) and the other transmitter may transmit another long training symbol using an odd set of subcarriers at a particular time interval, Appellants note that Gardner does *not* teach the number of antennas utilized in this embodiment. If one antenna per transmitter is assumed, then Gardner does *not* teach a *transmitter having N antennas*, as required by independent claims 1, 14, and 38. If *more than one antenna per transmitter* is assumed, then it is noted that Gardner teaches "sending a different set of subcarriers *from each transmitter*." (Paragraph [0037]; emphasis added.) Gardner does *not* disclose or suggest *wherein each of said subcarriers are active on only one of said N antennas at a given time*, as required by independent claims 1, 14, and 38. Independent claims 1 and 14 require transmitting from a *transmitter having N antennas* at least one training symbol using at least one antenna, such that said at least one training symbol can be interpreted by a receiver having M antennas, where M is less than N and *wherein said at least one training symbol comprises a plurality of subcarriers and wherein each of said subcarriers are active on only one of said N antennas at a given time*. Independent claim 38 requires transmitting a legacy preamble having at least one long training symbol and at least one additional long training symbol on *each of said N transmit antennas of a transmitter*, such that said training symbols can be interpreted by a receiver having M antennas, where M is less than N *wherein said at least one training symbol comprises a plurality of subcarriers and wherein each of said subcarriers are active on only one of said N antennas at a given time.*

In the Advisory Action, the Examiner indicates that the limitation "wherein each of the subcarriers are active on only one of said N antennas at a given time" is equivalent to the idea of having one antenna transmit a long training symbol using an even set of carriers and the other antenna using (an) odd set of carriers to transmit the other long training symbol.

As noted above, Gardner teaches "sending a different set of subcarriers *from each transmitter*." (Emphasis added.) Appellants emphasize that Gardner's teaching is in regard to a transmitter, and *not* an antenna. If each transmitter has one antenna, then Gardner does *not* teach a *transmitter having N antennas*, as required by independent claims 1, 14, and 38; if each

transmitter has multiple antennas, then Gardner does *not* disclose or suggest *wherein each of said subcarriers are active on* *__only one of said N antennas__* *at a given time*, as required by independent claims 1, 14, and 38.

Thus, Gardner et al., Kadous et al., Banister et al., and Crawford et al., alone or in combination, do not disclose or suggest transmitting from a transmitter having N antennas at least one training symbol using at least one antenna, such that said at least one training symbol can be interpreted by a receiver having M antennas, where M is less than N and wherein said at least one training symbol comprises a plurality of subcarriers and wherein each of said subcarriers are active on only one of said N antennas at a given time, as required by independent claims 1 and 14, and does not disclose or suggest transmitting a legacy preamble having at least one long training symbol and at least one additional long training symbol on each of said N transmit antennas of a transmitter, such that said training symbols can be interpreted by a receiver having M antennas, where M is less than N wherein said at least one training symbol comprises a plurality of subcarriers and wherein each of said subcarriers are active on only one of said N antennas at a given time, as required by independent claim 38.

<u>Independent Claims 22 and 26</u>

Independent claims 22 and 26 were rejected under 35 U.S.C. §103(a) as being unpatentable over Gardner et al. in view of Kadous et al. Regarding claim 22, the Examiner asserts that Kadous discloses wherein a signal field is diagonally loaded across said plurality of transmit antennas (paragraphs 0013, 0053-0054, 0059, and 0076; and FIG. 3A). In the Response to Arguments section of the final Office Action, the Examiner asserts that "diagonal loading" and "low order receiver" were not defined with functionality in the claim and that the claimed feature is broadly interpreted by the Examiner.

Appellants note that the present disclosure teaches:

> a method and apparatus are disclosed for transmitting symbols in a multiple antenna wireless communication system, *such that the symbols can be interpreted by a lower order receiver* (i.e., a receiver having a fewer number of antennas than the transmitter). *For example, subcarriers from one or more symbols can be transmitted using a plurality of antennas in the multiple antenna wireless communication system,* *__such that each of the subcarriers are active on only one of the antennas at a given time__*. *In one exemplary implementation, the subcarriers are diagonally loaded across logically adjacent antennas.*
> (Summary of the Invention; emphasis added.)

FIG. 4 illustrates long training symbols for a MIMO-OFDM system in accordance with the present invention, *where the subcarriers from the training symbol of FIG. 3 are diagonally loaded across three exemplary transmit antennas*. FIG. 4 illustrates the first 16 subcarriers seen at the input of the Inverse Fast Fourier Transform (IFFT) for each of three antennas, $\mathbf{t}_l^1$ through $\mathbf{t}_l^3$, where $\mathbf{t}_l^n$ stands for the long training symbol transmitted on the n-th transmit antenna. *In the example shown in FIG. 4, each subsequent subcarrier is transmitted on an adjacent antenna in a round robin fashion. Thus, only one-third of the subcarriers are transmitted on each antenna and the remaining subcarriers are nulled.*

(Page 5, lines 17-25; emphasis added.)

In addition, Appellants note that Kadous teaches:

[0076] FIG. 3A shows the PAC transmission scheme for a spatial multiplexing mode whereby N_T symbol streams are transmitted diagonally from all N.sub.T transmit antennas. For the first symbol stream $\{x_1\}$, the first four symbols $x_{1,1}$, $x_{1,2}$, $x_{1,3}$, and $x_{1,4}$ are transmitted on subbands 1, 2, 3, and 4, respectively, of transmit antennas 1, 2, 3, and 4, respectively. The next four symbols $x_{1,5}$, $x_{1,6}$, $x_{1,7}$, and $x_{1,8}$, wrap around and are transmitted on subbands 5, 6, 7, and 8, respectively, of transmit antennas 1, 2, 3, and 4, respectively. For the second symbol stream $\{X_2\}$, the first four symbols $x_{2,1}$, $x_{2,2}$, $x_{2,3}$, and $x_{2,4}$ are transmitted on subbands 1, 2, 3, and 4, respectively, of transmit antennas 2, 3, 4, and 1, respectively. The next four symbols $x_{2,5}$, $x_{2,6}$, $x_{2,7}$, and $x_{2,8}$ wrap around and are transmitted on subbands 5, 6, 7, and 8, respectively, of transmit antennas 2, 3, 4, and 1, respectively. Similarly, each of the other two symbol streams is transmitted across the N_T transmit antennas and wraps around as many times as needed. As shown in FIG. 3A, the four symbol streams start in the same subband (subband 1) and no zeros need to be padded at the start or the end of the frame.

As noted above, the present disclosure teaches how *an indication of a duration to defer until a subsequent transmission is transmitted, wherein the indication is transmitted <u>such that the indication can be interpreted by a lower order receiver by diagonally loading a SIGNAL field across a plurality of transmit antennas</u>*. The diagonal loading of Kadous, however, does *not* allow for *transmitting an indication of a duration to defer until a subsequent transmission, said indication transmitted <u>such that said indication can be interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of transmit antennas</u>*.

Regarding the definition of a "lower order receiver," Appellants note that this term is well understood in the art and note that a person of ordinary skill in the art would recognize that a "lower order receiver" is a receiver that is capable of receiving data from only a smaller number of transmitted signals than a higher order receiver. For example, United States

Patent Numbers 7,436,895 utilizes the term "order" in this context to describe a MIMO receiver.

Regarding the Examiner's assertion that the claimed feature ("diagonally loading") is broadly interpreted by the Examiner, Appellants note that, clearly, a patentee is entitled to be his own lexicographer. See, e.g., *Rohm & Haas Co. v. Dawson Chemical Co., Inc.*, 557 F. Supp 739, 217 U.S.P.Q. 515, 573 (Tex. 1983); *Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861, 228 U.S.P.Q. 90 (Fed. Cir. 1985); and *Fonar Corp. v. Johnson & Johnson*, 821 F.2d 627, 3 U.S.P.Q.2d 1109 (Fed. Cir. 1987).

The interpretation of the term "diagonally loading" asserted by the Examiner is inconsistent with the definition provided in the specification and is not how the term would be understood by a person of ordinary skill, based on the specification. When the specification explains and defines a term used in the claims, without ambiguity or incompleteness, there is no need to search further for the meaning of the term. *Multiform Desiccants Inc. v. Medzam Ltd.*, 133 F.3d 1473, 45 U.S.P.Q.2d 1429, 1433 (Fed. Cir. 1998).

Independent claims 22 and 26 require receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication can be interpreted by a lower order receiver *by diagonally loading a SIGNAL field across said plurality of transmit antennas*; and deferring for said indicated duration.

Thus, Gardner et al., Kadous et al., Banister et al., and Crawford et al., alone or in combination, do not disclose or suggest receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication can be interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of transmit antennas; and deferring for said indicated duration, as required by independent claim 22, and do not disclose or suggest at least one receive antenna for receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication can be interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of transmit antennas; and means for deferring for said indicated duration, as required by independent claim 26.

<u>Independent Claims 30 and 34</u>

Independent claims 30 and 34 were rejected under 35 U.S.C. §103(a) as being unpatentable over Gardner et al. in view of Banister et al. Regarding claim 30, the Examiner asserts that Banister discloses obtaining feedback (col. 4, lines 25-34) from at least one receiver

indicating a performance for at least one of said N transmit branches (col. 2, lines 8-21); and adapting one or more parameters of said at least one of the N transmit branches (col. 4, lines 25-34).

Appellants note that Banister teaches to modify the antenna weights. (See, col. 4, lines 25-34.) Banister does *not* disclose or suggest *adapting a* <u>*modulation scheme or encoding rate*</u> *of at least one of the N transmit branches* <u>*based on feedback to a transmitter from at least one receiver indicating a performance for at least one of said N transmit branches*</u>. Independent claims 30 and 34 require transmitting one or more symbols from a transmitter having N transmit branches; *obtaining* <u>*feedback*</u> *at said* <u>*transmitter*</u> *from at least one* <u>*receiver*</u> *indicating a* <u>*performance for at least one of said N transmit branches*</u>; and adapting one or more parameters of said at least one of said N transmit branches *based on said feedback, wherein said one or more parameters includes a* <u>*modulation scheme and encoding rate*</u>.

Thus, Gardner et al., Kadous et al., Banister et al., and Crawford et al., alone or in combination, do not disclose or suggest transmitting one or more symbols from a transmitter having N transmit branches; obtaining feedback at said transmitter from at least one receiver indicating a performance for at least one of said N transmit branches; and adapting one or more parameters of said at least one of said N transmit branches based on said feedback, wherein said one or more parameters includes a modulation scheme and encoding rate, as required by independent claim 30, and do not disclose or suggest N transmit branches for transmitting one or more symbols; a feedback path for obtaining feedback at said transmitter from at least one receiver indicating a performance for at least one of said N transmit branches; and means for adapting one or more parameters of said at least one of said N transmit branches based on said feedback, wherein said one or more parameters includes a modulation scheme and encoding rate, as required by independent claim 34.

<u>Conclusion</u>

The rejections of the cited claims under section 103 in view of Gardner et al., Kadous et al., Banister et al., and Crawford et al.,, alone or in any combination, are therefore believed to be improper and should be withdrawn. The remaining rejected dependent claims are believed allowable for at least the reasons identified above with respect to the independent claims.

The attention of the Examiner and the Appeal Board to this matter is appreciated.

Respectfully,

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CLAIMS APPENDIX

1. A method for transmitting one or more training symbols in a multiple antenna communication system, said method comprising the step of:

transmitting from a transmitter having N antennas at least one training symbol using at least one antenna, such that said at least one training symbol can be interpreted by a receiver having M antennas, where M is less than N and wherein said at least one training symbol comprises a plurality of subcarriers and wherein each of said subcarriers are active on only one of said N antennas at a given time.

2. The method of claim 1, wherein said receiver is a SISO receiver.

3. The method of claim 1, wherein said at least one training symbol is an 802.11 a/g training symbol.

4. The method of claim 1, wherein said at least one training symbol comprises at least one long training symbol and at least one SIGNAL field.

5. (Cancelled)

6. The method of claim 4, wherein said SIGNAL field indicates a duration that a receiver should defer until a subsequent transmission.

7. The method of claim 1, wherein said at least one training symbol comprises said plurality of subcarriers and wherein said transmitting step further comprises the step of diagonally loading said subcarriers across said N antennas.

8. The method of claim 6, whereby a lower order receiver can interpret said transmitted duration.

9. The method of claim 6, wherein said duration is represented as a duration of said transmission.

10. The method of claim 6, wherein said duration is represented as a length of said transmission.

11. The method of claim 4, wherein said SIGNAL field indicates a number of said antennas in said multiple antenna communication system.

12. The method of claim 11, wherein said number of said antennas allows said multiple antenna communication system to be scalable.

13. The method of claim 11, wherein said number of said antennas allows a receiver to correlate channel coefficients with corresponding transmit antennas.

14. A transmitter in a multiple antenna communication system, comprising:

N transmit antennas for transmitting at least one training symbol using at least one antenna, such that said at least one training symbol can be interpreted by a receiver having M antennas, where M is less than N and wherein said at least one training symbol comprises a plurality of subcarriers and wherein each of said subcarriers are active on only one of said N antennas at a given time.

15. The transmitter of claim 14, wherein said receiver is a SISO receiver.

16. The transmitter of claim 14, wherein said at least one training symbol is an 802.11 a/g training symbol.

17. The transmitter of claim 14, wherein said at least one training symbol comprises at least one long training symbol and at least one SIGNAL field.

18. (Cancelled)

19. The transmitter of claim 17, wherein said SIGNAL field indicates a duration that a receiver should defer until a subsequent transmission.

20. The transmitter of claim 14, wherein said subcarriers are diagonally loaded across said N transmit antennas.

21. The transmitter of claim 17, wherein said SIGNAL field indicates a number of said antennas in said multiple antenna communication system.

22. A method for receiving data on at least one receive antenna transmitted by a transmitter having a plurality of transmit antennas in a multiple antenna communication system, said method comprising the step of:

receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication can be interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of transmit antennas; and

deferring for said indicated duration.

23. The method of claim 22, wherein said method is performed by a SISO receiver.

24. The method of claim 22, wherein said indication is transmitted in said SIGNAL field that complies with the 802.11 a/g standards.

25. (Cancelled)

26. A receiver in a multiple antenna communication system having at least one transmitter having a plurality of transmit antennas, comprising:

at least one receive antenna for receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication can be interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of antennas; and

means for deferring for said indicated duration.

27. The receiver of claim 26, wherein said method is performed by a SISO receiver.

28. The receiver of claim 26, wherein said indication is transmitted in said SIGNAL field that complies with the 802.11 a/g standards.

29. (Cancelled)

30. A method for communicating in a multiple antenna communication system, said method comprising the step of:

transmitting one or more symbols from a transmitter having N transmit branches;

obtaining feedback at said transmitter from at least one receiver indicating a performance for at least one of said N transmit branches; and

adapting one or more parameters of said at least one of said N transmit branches based on said feedback, wherein said one or more parameters includes a modulation scheme and encoding rate.

31. (Cancelled)

32. (Cancelled)

33. (Cancelled)

34. A transmitter in a multiple antenna communication system, comprising:

N transmit branches for transmitting one or more symbols;

a feedback path for obtaining feedback at said transmitter from at least one receiver indicating a performance for at least one of said N transmit branches; and

means for adapting one or more parameters of said at least one of said N transmit branches based on said feedback, wherein said one or more parameters includes a modulation

scheme and encoding rate.

35. (Cancelled)

36. (Cancelled)

37. (Cancelled)

38. A method for transmitting data in a multiple antenna communication system having N transmit antennas, said method comprising the step of:

transmitting a legacy preamble having at least one long training symbol and at least one additional long training symbol on each of said N transmit antennas of a transmitter, such that said training symbols can be interpreted by a receiver having M antennas, where M is less than N and wherein said at least one training symbol comprises a plurality of subcarriers and wherein each of said subcarriers are active on only one of said N antennas at a given time.

39. The method of claim 38, wherein said legacy preamble further comprises at least one short training symbol.

40. The method of claim 38, wherein said legacy preamble further comprises at least one SIGNAL field.

41. The method of claim 38, wherein said legacy preamble is an 802.11 a/g preamble.

EVIDENCE APPENDIX

There is no evidence submitted pursuant to § 1.130, 1.131, or 1.132 or entered by the Examiner and relied upon by appellant.

RELATED PROCEEDINGS APPENDIX

There are no known decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 CFR 41.37.